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CHAPTERS FROM THE ACADEMIC ASPECT OF PROJECT MANAGEMENT - RESEARCH AND TEACHING METHODOLOGIES VOLUME VI

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PILOT STUDY ON CHANGES IN GROUP PROCESSES AND INTERACTIONS DURING THE LIFE CYCLE PHASES OF UNIVERSITY COURSE PROJECTS

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Abstract: Universities should face labour market requirements and prepare students for the challenges of employment. Therefore, university courses should also foster project management knowledge and skills. This study aims to contribute to the development of teaching project management with a project-based methodology. Three university course project teams were investigated during the life cycle phases of their projects. A mixed methodology was applied, including survey and observational methods, to explore the changes in entitativity, flow and conversational coherence throughout their project meetings. These results were compared to the evaluation of the teamwork and the success of the projects. Results indicate that university course projects differ from classical projects and that group processes and interactions change during the project life cycle phases.

Keywords: group interaction, group process, higher education, project life cycle, project-based learning

1. Introduction

Nowadays, organisations must face a highly competitive, constantly changing, global environment. Thus, flexible structures and efficient decision-making processes are keys of success (Kerr & Tindale, 2004). “Today’s organizations have responded to growing uncertainty by turning increasingly to workgroups” (Navarro et al., 2015, p. 928). These groups often work together in a project-based structure to be able to face challenges. Therefore, employees should learn how to cooperate, share their knowledge and make shared decisions within their project teams (Chiocchio & Essiembre, 2009). “Leadership style of and co-operation in the project team greatly influence the working habits within the project organization” (Venczel et al., 2021, p. 6). This means working in project teams and successfully managing projects require specific skills and knowledge.

Universities should also face these labour market requirements, because one purpose of higher education is to prepare the students for employment. According to Kopp (2015), the learning objectives of university courses should be defined to strengthen the connections between work and education. Thus, universities offer courses on project management, teaching not only the theory of this field but also fostering project management competencies and other soft skills. Besides these aims, courses about other topics can also be taught with a project-based methodology. In such cases, project management is not the primarily content, but the tool for learning and skill development (Dimmitt, 2017). Project-based learning (PBL) is an active, student-centred form of instruction, which is characterised by students’ autonomy, constructive investigations, goal setting, collaboration, communication, and reflection within real-world practices (Kokotsaki et al., 2016). According to a current review of PBL in higher education, future research should be conducted on students’ learning processes and the final products (Guo et al., 2020). Therefore, this paper focuses on how the project-based learning methodology is applied in teaching project management competencies and soft skills. We are only studying project management courses to provide starting points for improving the methodology of teaching project management at universities.

In educational context, we focus on university course project teams and consider projects as temporary organisations (Lundin & Söderholm, 1995). “A group project refers to a unique, one-time group student assignment, with defined project objectives, use of resources, reporting, assessments and grade evaluations” (Shariff et al., 2013, p. 748). Only few studies show how these student projects evolve (for example, Pokharel, 2021). Even less research is dedicated to investigating what happens in these project teams during the life cycle phases of their projects.

In this paper, we apply the definition and phases of the project life cycle that were provided by the Project Management Institute (2017). These phases include Initiation, Planning, Executing, Monitoring, Controlling, and Closing. The life cycle phases provide a framework for studying project teams in university courses.

1.1. Group interactions and processes

Other aspects of teamwork should also be considered to further narrow down the scope of this study. Cooperation in the project team influences working habits and relationships in the project organisation which contribute to the success of the project (Venczel et al., 2021). Therefore, it is worthwhile to continue the investigation of project teams by exploring group interactions and processes that make cooperation possible. In the following overview, I introduce three social psychological and communicational aspects that could contribute to the research of project teams.

The first aspect includes groupness and entitativity. The research on groupness aims to define characteristics based on which a set of people can be identified as a real group (Lickel et al., 2000). The authors of the 1950s defined groupness “as a fundamental process for the existence of a group and one that explains the extent to which a set of people can be characterized” as a group (Meneses et al., 2008, p. 495). In the following decades, researchers have focused on members’ awareness of belonging to a group. The term entitativity was first used by Campbell (1958). The concept provides perspectives on how much a group can be seen as a coherent entity (Meneses et al., 2008). Campbell (1958) identified the similarity of the group members to each other, the duration of the group and the permeability of the group’s boundaries as essential aspects of entitativity research. Lickel et al. (2000) have provided empirical support for this concept and defined the following descriptive dimensions of entitativity: interaction and similarity between group members, shared goals and results, and importance of the group for its members. In groups with a high level of entitativity, members feel less like individuals and more like parts of the group (Blanchard et al., 2022).

Several factors may influence the perception of entitativity. According to Lickel et al. (2000), these variables include chronic perceiver differences, contextual factors, and the properties of the group. For instance, several researchers have studied the relationship between the size and the entitativity of a group, however, this field lacks consensus (Lickel et al., 2000). The study of small groups is relevant in this regard, as these are common social constructs of research methodology and organisations. The aspect of entitativity is relevant in the labour market

because perceivers view high entitativity groups as possessing more capacity for collective action than low entitativity groups (Lickel et al., 2000). According to Navarro et al. (2011), strong potency beliefs in the group's capacity, strong identification of the members with their group, and a high Level of Group Development (LGD) are indicators of an authentic work group. The LGD includes the interrelation among members, the identification with the group, the coordination of behaviours, resources and technologies, and the orientation of the members towards a shared goal (Navarro et al., 2015).

Along these dimensions, entitativity can be measured in an organisational context. On the one hand, research can focus on the perceiver's perspective by applying an observational method (Navarro & Meneses, 2018). A newly developed method is the Groupness/Entitativity Observational Coding (GEOC), which measures the four dimensions of the interrelationship between group members, group identification, coordination, and orientation of members to group roles (Navarro & Meneses, 2018). On the other hand, research can focus on the group member's perspectives by applying a survey method (Navarro et al., 2015). In the context of small workgroups, the Level of Group Development Questionnaire can be applied (Navarro et al., 2015). This tool provides an opportunity for a rapid, empirically supported assessment of work teams' entitativity.

In addition to entitativity, group interactions and processes can be studied from the point of view of communication science. Communicative competence consists, among other aspects, of "the ability and motivation to establish an orderly and meaningful discourse" (Boos, 2018, p. 503). Therefore, group members' communication can be described from different angles, including the coherence of their conversations and the smoothness of their topic development (Cornelius & Boos, 2003). These aspects are relevant because group tasks and shared goals require an effective communicative exchange and mutual understanding between group members (Cornelius & Boos, 2003). Communication in groups is a dynamic and collaborative process. However, the conversation can become a 'collective monologue' (Boos et al., 2013, p. 447) when it lacks coherence. If the team members pay attention to the topic management and they reflect on what was said before, a high level of conversational coherence can be observed (Boos et al., 2013). On the contrary, when the content of the next conversational act does not connect to prior acts, the conversation becomes incoherent (Boos, 2018).

The coherence of conversation can be measured by identifying coherent and incoherent topic management techniques. Boos (2018) has developed a framework based on the topic management definitions by Crow (1983). The observational method, named Coherence in

Conversation (CoCo), includes eight topic management mechanisms, four of which belong to the coherent and the remaining four to the incoherent conversational acts (Boos, 2018). For instance, *Maintaining* is a coherent mechanism because it means that the speaker does not change the topic of conversation.

Besides addressing entitativity and conversational coherence, the third chosen group process is flow. The concept of flow is based on the framework of positive psychology (Oláh, 2012) and the theory of Csíkszentmihályi (1990). According to his tunnel model, the short-term experience of flow includes being fully absorbed in an activity or task which is highly challenging for an individual. Hence, he performs at the peak of his abilities. If the level of challenges and skills match, the individual experiences energised, deep focus, and success. Flow is an intrinsically rewarding mental state, an autotelic experience. It is characterized by a balance between challenges and skills, clear goals, unambiguous feedback, concentration on the task at hand, a sense of control, the loss of self-consciousness, action-awareness merging, and the transformation of time (Hart & Di Blasi, 2015). Experiencing boredom, anxiety, or apathy while performing a task hinders the flow state (Oláh, 2005).

The original theory has heavily influenced psychology, and the concept of flow is widely studied (de Moura Jr. & Porto Bellini, 2019). Fields of research include, for instance, arts (Łucznik & May, 2021), sports (Bakker et al., 2011), education (Oláh, 2005), and organisations (Salanova et al., 2003). “Educational settings for example, provide a clear avenue for application of findings” (Hart & Di Blasi, 2015, p. 277). Thanks to the encouragement and the joy flow provides, the process of learning and skill development can be fostered. The positive effects of flow can be discovered in the workplace too. As social interactions and team settings characterise modern workplaces, an interdependence between employees arises. Thus, sharing goals and information within the teams and the organisation contribute to performance (Aubé et al., 2014). Some authors argue that in such social situations, flow can spread from one member to another, causing a contagion effect (Bakker et al., 2011). Therefore, the investigation of flow in groups has emerged, especially focusing on the relationship between the level of flow and team performance (Heyne et al., 2011).

Flow can be measured by qualitative methods, such as interviews or observation (Csíkszentmihályi, 1990). However, quantitative methods, such as surveys, have also been implied in the last thirty years (de Moura Jr. & Porto Bellini, 2019). The literature review paper of de Moura Jr. and Porto Bellini (2019) shows that the Flow Short Scale and the Experience Sampling Method are the most widely used scales. More situation-specific questionnaires were

developed for different fields of study. For example, the situation-specific Flow Questionnaire of Oláh (2005) measures flow in an educational context.

1.2. Research goals

Only a few studies try to explore project management in connection with group processes and interactions in an educational context. Thus, this research aims to connect the aspects of project management with the introduced group processes and PBL. Its purpose is to explore the relationship between group interactions and processes during the life cycle phases of university course projects. The study aims to seek answers to the following questions:

RQ1: How does the level of entitativity change during the life cycle phases of university course projects?

RQ2: How does the level of individual flow change during the life cycle phases of university course projects?

RQ3: How does the level of conversational coherence change during the life cycle phases of university course projects?

RQ4: Do the levels of entitativity and individual flow correlate during the life cycle phases of university course projects?

RQ5: How do these group processes and interactions influence the results of the university course projects, namely the successful completion of the projects and the successful project management processes?

In addition to providing answers to these questions, this research aims to prepare the Hungarian versions of internationally developed research methods (Ujhelyi, 2011). The paper also aims to understand the team dynamics in project management with the research methodology of communication science, pedagogy, and psychology.

2. Research methodology

This pilot study was conducted on a small sample, including three self-managed, temporary project teams with 15 members from six countries. Two teams were Hungarian and used their native language as a working language. One team was international and spoke English. Their countries of origin included Ukraine, Tunisia, Brasilia, Kazakhstan, and Iran. All team members have visited the same graduate programme at a Hungarian university in the field of communication and media science. Therefore, the participants' highest degree of education was a bachelor's diploma. All participants were female, and their average age was 24.

All participating project teams had to fulfil the same task in the framework of a course on project management. Between September and December 2022, they had to organise an event and realise a media campaign. The time range for the project was strictly defined, because the teams had to present their achievements at the beginning of December for their instructor and a professional jury. The topic of the projects and other KPIs were not predefined. The course's objectives included learning about PM and PR methods and practicing them simultaneously. Additionally, several soft skills were developed during these three months of teamwork, including cooperation, communication, and structured thinking. Practising project management in education can also contribute to the development of leadership and problem-solving skills (Pokharel, 2021).

As university course projects were observed, several characteristics of the sample differentiate the participating teams from classical project teams that are defined by Chiocchio and Essiembre (2009). The students executed non-profit course projects; no budget was provided for them. The organisational context of the projects was educational. Thus, the observed projects cannot be considered strategical projects, according to Görög (1999). The teams were autonomous and self-managing, according to the team characteristics described by Roper and Phillips (2007). Classical project roles were not determined, and the students could choose their own team members. Therefore, previous experiences from other courses and extracurricular activities may have influenced group dynamics and team roles. All these characteristics suggest that the phases of the project life cycle mix and blur in this educational context.

The three project teams were observed during all project life cycle phases. We have made video recordings of several project meetings. All meetings were organised in person, and every team member was always present. We have neither influenced the meetings nor determined their length or topic. The video recordings were only used for research purposes and all participants provided their consent regarding data protection. With the help of the videos, the methods

Coherence in Conversation (CoCo) (Boos, 2018) and Groupness/Entitativity Observational Coding (GEOC) (Navarro & Meneses, 2018) were applied.

Immediately after each recorded meeting, team members filled out a survey that included the Level of Group Development Questionnaire (LGD) (Navarro et al., 2015) and the situation-specific Flow Questionnaire for education (Oláh, 2005). The items were translated into Hungarian and English by the author. As the LGD was originally published in English, we have validated the Hungarian translation on a different sample of 15 participants (university students aged between 22 and 27 years, 10 female and 5 male). The Hungarian version proved reliable with a Cronbach's alpha value of 0.82. The LGD also proved reliable in the research and had a Cronbach's alpha value of 0.84 on the sample. The utilized flow scale also proved to be reliable and had a Cronbach's alpha value of 0.82 on the sample.

The *Initiation* and *Planning* phase merged in the first meeting, a decision-making session. In the middle of September, all teams had to decide on the topic of their projects and the type of event they wanted to organise. These sessions provided 54 minutes of footage altogether. The sessions were coded by the author and another researcher. One third of the results the coders provided did not overlap. Therefore, the coders argued about the disparities, and finally agreed on the final scores that are presented in this paper.

Next, the *Execution* phase followed in which the students have gained new knowledge about PM and PR methods from the instructor and started to implement their project. The next recordings were made in the middle of November when the own events were ahead of the teams, but they have already set a date, found a venue, and organised sponsors. Essential tasks included starting the PR campaign of the project, inviting speakers, and scheduling the event. While executing the projects, the teams had to fulfil the requirements of the course too. In this phase, they had to hand in a project plan so that the instructor could see the objectives and KPIs of the projects. In this phase we recorded 144 minutes of footage altogether that were analysed like in the previous phase.

Next, the *Closing* phase followed which consisted of the final presentations, and the project's evaluations. The instructor of the course defined the evaluation system that was used in this study.

1. Firstly, the instructor evaluated the written material provided for the projects on a scale from 0 to 5. These included the project and budget plan, fundraising activity, communication strategy and social media campaign, photo documentation, digital presentation, and a final report (a maximum of 40 points). Additional points can be

given, among others, for detailed risk analysis, landing page for the project, documented use of a PM tool and appearance in news outlets (a maximum of 16 points can be given for bonus activities).

2. Secondly, the final presentations of the project teams were evaluated by a professional jury on a scale from 0 to 5. Aspects included understandable project goals, a clear fundraising strategy, effective task management and cooperation, a social media campaign, photo documentation, and an exciting presentation (a maximum of 30 points). Bonus elements include detailed risk analysis, landing page and video documentation (additional 15 points could be awarded).
3. Thirdly, the self-evaluation of team members also contributed to the final grade. An average of individual scores was calculated based on the aspects of contribution to teamwork and satisfaction with the results of the project (altogether a maximum of 15 points).

A total score of 116 points could be achieved in this course. Summarising all the aspects of successful project management and project completion, the final score of the project groups can be compared to other results of this study, like the level of flow, entitativity and conversational coherence.

3. Results and discussion

3.1. Initiation phase

The participating teams fulfilled several tasks which belong to the Initiation phase based on the PMBOK (Project Management Institute, 2017). For instance, they identified stakeholders, and defined the scope of the project. However, the first meetings mainly consisted of a discussion about the project goals and the topic of the project. Two teams managed to agree on the topic of their projects which means that the decision-making process was successful. Team 3 could not come to a decision during the first session, and the concept they have realised later did not even appear in this conversation.

Table 1. shows the results of the Initiation phase. The average level of group development, measured with the LGD questionnaire the team members had to fill out after the meetings, showed quite high values. On a scale from 1 to 5, all teams have achieved better than 3. This result means that the team members saw a middle to high potency in the teamwork, identified themselves already with their groups to a certain extent, shared goals, and identified connections between the team members. On the contrary to the self-evaluation, the results of the observation on groupness and entitativity (GEOC) showed lower values. From the inside perspective, the members have indicated a higher level of entitativity in the LGD questionnaire than we have evaluated from the outside perspective by applying the GEOC method.

The conversational coherence varied between the low and the middle level. Team 3 received the highest value, which means that their conversation was the most coherent even though they were the only team that could not come to a final decision on the topic of the project. The averages of the individual flow scores show a high level of experienced flow. One possible reason for that may be the shared decision-making process involving brainstorming and creative idea generation in every team. The correlation coefficient (r) of the level of group development and the individual flow scores was 0.55 in this phase ($p < 0,01$). This indicates a middle level correlation of flow and the group development level in the initial phase of the projects. A higher level of individual flow is associated with a higher level of group development, and vice versa, a lower level of flow is associated with a lower level of group development.

Table 1.: Results on group processes and dynamics in the Initiation phase

Group processes and dynamics	team 1	team 2	team 3
the average level of group development (self-assessment with the LGD questionnaire)	4.46	3.74	4.66
the average level of groupness and entitativity (results of the GEOC)	2.29	3.41	3.37
the coefficient of coherence (results of the CoCo)	0.38	0.49	0.69
the average of individual flow scores (self-assessment with the situation-specific Flow Questionnaire)	no data	4.33	4.40

Source: own compilation

3.2. Planning and Execution phase

The Planning and the Execution phases merged in the observed project meetings. While the team members were also fulfilling tasks from the Planning phase, like estimating costs and defining responsibilities, they have already started organising their events which is a clear sign of execution. This mix of the project life cycle phases appeared because the teams had to hand in the project plans by the middle of the semester. Planning activities were assumably conducted before, but their results have not been written down. Thus, the project teams had to write the assignment for class, while also moving forward with their projects to be able to execute the events until the final deadline.

Table 2. shows the results of these meetings. Compared to the first meetings, the level of group development is lower in every group. On the contrary, the observed level of entitativity is higher than during the first meetings. These results show that the inside and the outside perspectives started to align. The self-measured values are still higher than the results of the observation but the gap between them is smaller than in the previous phase. The coefficient of coherence shows high values in every team, which means that their topic management became more structured than before. One possible reason for this change may be that the execution of precisely defined

tasks dominated these meetings. These meetings included fewer creative processes than the previous brainstorming and decision-making sessions. This may be the reason for the decrease in the flow scores too. Compared to the first sessions, members of teams 2 and 3 reported a lower level of flow and gave higher scores for boredom, apathy, and anxiety. These results may show that the approaching deadlines and the growing number of tasks hindered individual flow experiences to a certain extent in the execution phase. The correlation between the level of group development and individual flow showed higher values than in the previous phase. The correlation coefficient (r) was 0.66 in this phase ($p < 0,01$). This result shows an even stronger correlation between the level of individual flow and the level of group development than in the previous phase.

Table 2.: Results on group processes and dynamics in the Planning and Execution phase

Group processes and dynamics	team 1	team 2	team 3
the average level of group development (self-assessment with the LGD questionnaire)	4.41	3.69	4.55
the average level of groupness and entitativity (results of the GEOC)	3.61	2.89	3.78
the coefficient of coherence (results of the CoCo)	0.82	0.82	0.85
the average of individual flow scores (self-assessment with the situation-specific Flow Questionnaire)	4.35	3.18	4.25

Source: own compilation

3.3. Closing phase

The Closing phase consisted of the evaluation of the projects. Table 3. shows the scores that the participating project teams have achieved. It includes the evaluations of the professional

jury, the course instructor, and the self-evaluations of the team members. The final scores show that all three projects were successful because the students could achieve the highest grade (a 5 in Hungary). However, there are differences between the teams in all areas of evaluation. Team 1 achieved the highest score (108 points out of 116), then team 3 follows with 101 points. Team 2 gained 86 points, and the self-evaluation scores were lower than in the other groups.

Table 3.: Results of the evaluation process

Results of the evaluation process (in points)	team 1	team 2	team 3
evaluation of the jury	37	33	41
evaluation of the instructor	56	42	45
self-evaluation of the team	15	11	15
final score	108	86	101

Source: own compilation

4. Discussion

The detailed evaluation of the project teams provides an opportunity for comparison with previous life cycle phases and the measured group processes. It also provides answers for RQ1, RQ2, and RQ3. Team 1 achieved the highest scores in the evaluation process and showed a high level of group development and entitativity in both observed meetings. Flow values in the Execution phase were the highest among all teams. The coherence of conversation has increased from the Initiation to the Execution phase. Team 2 with the lowest final score showed the lowest level of group development, entitativity and flow among the three teams throughout the whole project life cycle. The level of group development and entitativity decreased from the beginning to the middle of the semester. This means that the team saw lower potency in the groupwork, the members identified themselves less with the group, and there were fewer mutual relationships between them. The level of experienced individual flow has also sunk compared to the first meeting. The lower scores given for self-evaluation align with these results. Team 3 had the highest values of group development and entitativity among the three teams throughout the observed meetings. Their score of self-evaluation showed the highest value possible. This shows that the inner perspective of the group is aligned with the high final score and the jury's evaluation.

Considering all teams, the level of group development and individual flow correlated in the Initiation and the Planning-Execution phases which provides an answer for RQ4. The results of the self-assessments on the groupness and the entitativity of the teams were higher than the results of the observations in both measured phases. The differences between the two perspectives became smaller during the Execution phase. However, there are minor differences in the dimensions of the LGD questionnaire and the GEOC. This may be one reason for the differences between the two perspectives. Another aspect worth considering is that the teams with higher entitativity, conversational coherence and flow levels gave themselves higher scores in the evaluation process. The scores of the instructor and the jury were also higher in these cases. However, the correlation between the results of the research and the success of the project teams could not be measured due to the small sample size. Thus, the last research question (RQ5) could not be answered.

5. Conclusion

The results of the study show differences in group processes and interactions during the project life cycle phases. The Initiation phase included less structured conversations while team members experienced a high level of individual flow and considered their groups more developed than the observation showed. The Execution phase merged with the Planning phase and included more structured conversations with lower flow and higher anti-flow rates. The inner and outer perspectives on entitativity and group development converged more than during the first phase. The levels of individual flow and group development correlated with each other in these two phases. The final evaluations were provided only on a group level. Thus, the small sample made statistical measurements not possible. The connections between the measured concepts and the final scores of the projects could not be explored. Only assumptions can be made about the keys of successful teamwork and project management. For instance, the teams with a higher level of group development gave themselves higher scores while evaluating their own projects and teamwork. Future studies should be conducted on a larger sample to overcome this limitation.

When designing future studies, another aspect should also be considered. The results show differences between projects in an educational context and strategic, corporate projects. The most important difference is that the project life cycle phases mix and blur when the tasks for class are not aligned with the timing of the projects and the teams work autonomously. In the observed project teams, the project roles were not predefined. This situation provides opportunities for including new aspects in next studies. Future research could identify the roles and responsibilities of the team members based on their communication style or observe leadership emergence in university course project teams.

Another possible direction for future research includes measuring group flow instead of individual flow during the project life cycle phases. Early research has mainly focused on the individual flow experience, but in the last twenty years, the social aspects of flow also gained attention (Sawyer, 2017). Group flow provides a shared positive experience for group members and suggests a balance in the group's behaviour (Pels et al., 2018). "Group flow is defined as those moments in a group activity when participants experience flow simultaneously in a collaborative task" (Łuczniak & May, 2021, p. 3). The experience differs from individual flow, as it is a "collective state of mind" (Pels et al., 2018, p. 18). Studies show that group flow is more enjoyable than solitary flow (Walker, 2010). Still there is little research on the relations of entitativity and group flow. Therefore, investigating group flow in the context of project

management provides new research opportunities. All in all, this pilot study provides starting points for future research. It shows how the perspectives and the methodology of organisational communication, psychology, and project management could be considered in a study.

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